Patent Search

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Abstract:

The present invention presents an intelligent solution for real-time temperature prediction of a DC motor by integrating a K-Nearest Neighbor (KNN)–based machine learn model with an Arduino Mega microcontroller. The system continuously monitors essential motor operating parameters, including voltage, current, and rotational speed, a these parameters as inputs to the trained KNN model to estimate the motor's internal temperature. By relying on data-driven prediction rather than direct sensing, the sys avoids the need for a physical temperature sensor during normal operation. The KNN model is trained in an external computing environment using datasets collected unc various load and speed conditions to capture realistic motor behavior. After training, the model is translated into Arduino-compatible code and deployed on the microcont for on-device inference. During operation, the Arduino evaluates the predicted temperature and initiates appropriate protective actions—such as reducing motor speed or shutting down the motor—when abnormal thermal conditions are detected. This predictive and proactive approach enhances thermal protection, improves motor reliabili lifespan, and provides a low-cost embedded machine learning solution well suited for industrial automation, automotive systems, robotics, and other applications requirin intelligent motor monitoring

Complete Specification

Description:The invention presents an intelligent temperature prediction system for a DC motor using a Random Forest regression model deployed on an Arduino Mega microcontroller. The system is composed of the following key components:

1. DC Motor

A conventional DC motor whose thermal condition must be monitored and controlled during operation to prevent overheating and ensure long-term reliability.

2. Arduino Mega

A microcontroller that executes the embedded K-Nearest Neighbor model. It continuously acquires real-time operating data—such as voltage, current, and motor speed· and uses these inputs to estimate the internal temperature of the motor.

3. Motor Driver (e.g., L298N)

A driver module responsible for controlling the motor's speed and direction. It receives commands from the Arduino based on the predicted temperature values to ensu safe operation.

4. Random Forest Model (Trained Offline)

The machine learning model is developed and trained in an external computing environment using datasets that consist of motor voltage, current, rotational speed, and corresponding measured temperature values. After the training phase, the K-Nearest Neighbor (KNN) model is adapted into a form suitable for execution on the Arduinc platform and uploaded to the microcontroller, where it performs real-time temperature prediction during motor operation.

5. Temperature Sensor (Used Only for Training)

View Application Status

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